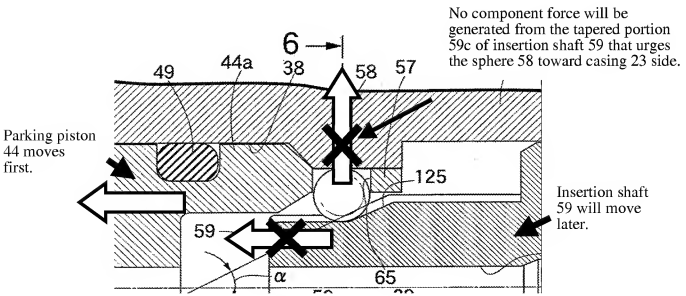
Contrast between invention and primary reference

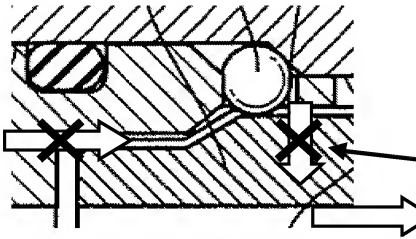
Owing to the additional features in applicant's proposed amendment to claim 1, when obtaining a parking brake state, it is arranged that the parking piston (44) is moved forward and subsequently, the lock piston (56) is moved forward. With this arrangement, the parking piston and lock piston can be slid smoothly. That is, without this arrangement, such inconvenience will occur that in a state where the spheres (58) are clamped between the parking piston (44) and the tapered portion (59c) of the insertion shaft (59), the spheres (58) receive the force from the insertion shaft (59) which is moving forward so that a component force of the forwardly moving force acts on the spheres (58) to urge them toward the casing (23), making a smooth slide movement of the parking piston (44) and tapered portion (59c) difficult. See the following reference view 1 showing how the arrangement according to applicant's proposed amended claim 1 will operate in this regard, which is prepared using Fig. 5.

REFERENCE VIEW 1



Owing to the arrangement according to applicant's amended claim 1, when releasing the parking brake state, as shown in the following reference view 2 as prepared using Fig. 7 of the application, the lock piston (56) moves rearward and subsequently, the parking piston (44) moves rearward. This arrangement serves to avoid such inconvenience that the force generated by the rearward movement of the parking piston (44) urges the spheres (58) against the tapered restricting step (42) on the casing (23) side, whereby a component force caused by such urging acts on the spheres to be pushed toward the lock piston (56) side, making the movement of the lock piston (56) difficult.

REFERENCE VIEW 2

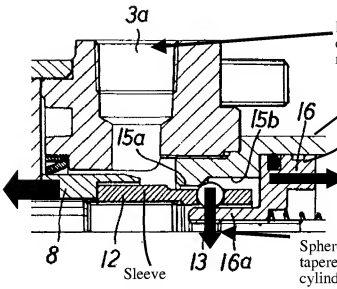


As will be apparent from the above, the arrangement according to the amended claim 1 contributes to avoiding the inconveniences that at the time of obtaining a parking brake state or of releasing such brake state, the spheres undesirably obstruct the movement of the parking piston or insertion shaft. The arrangement according to applicant's amended claim 1 enables smooth movements of these members.

On the other hand, the cited reference JP 57-190903 relates to a fluid pressure cylinder device equipped with a lock device for a piston. When the piston rod 9 is moved for assuming its lock state, the spheres 13 on the sleeve 12 which is integrally movable with the piston rod 9 are put into contact with the auxiliary piston 16. In order to obtain a locked state, it is required to displace the auxiliary piston 16, which is in contact with the spheres 13, against the force of spring 22. This structure obstructs a smooth movement of the sleeve 12. Please see Fig. 2 of this reference.

Moreover, when a locked state of the piston rod 9 is to be released, the fluid pressure is fed to the cylinder port 3a, thus the fluid pressure being applied to both of the piston rod 9 side and auxiliary piston 16 side. In this case, the spheres 13 receive a force acting in the returning direction of piston rod 9, i.e., in the opposite direction until the auxiliary piston 16 comes off from the sleeve 12 so that in that state, the spheres are urged against the tapered surface of the auxiliary cylinder tube 15. This causes the spheres to exhibit a force urging the auxiliary piston 16 downwardly in the figures so that the auxiliary piston 16 is difficult to move. See the following reference view 3, which is prepared using Fig. 3 of the reference, JP57-190903.

REFERENCE VIEW 3



Concerning the differences between the invention defined i

prior art known from JP57-190903, when referring to their embodiments, it can be argued that in JP57-190903, for locking of the piston rod 9, the movement of sleeve 12 places the spheres 13 in contact with the projecting portion 15a of auxiliary cylinder tube 15 thereby to hold the auxiliary piston 16 in place, whereas in the present invention, the spheres 58 are not pushed radially inwardly when moving from the inoperative state of Fig. 4 to the locked position of Figs. 7 and 8. The guide hole 39 does not act on the associated sphere 58 so as to force the sphere downwardly or radially inwardly. Accordingly, the lock piston 56 is not pushed by the spheres 58 so that the piston can perform slide movement.